

CONTRIBUTED PAPER

Wolves are back: Sociopolitical identity and opinions on management of *Canis lupus*

Lawrence C. Hamilton¹  | Joanna E. Lambert²  | Lydia Anne Lawhon³  | Jonathan Salerno⁴  | Joel Hartter³ 

¹Department of Sociology, University of New Hampshire, Durham, New Hampshire

²Environmental Studies Program and Department of Ecology and Evolutionary Biology, University of Colorado, Boulder, Colorado

³Environmental Studies Program, University of Colorado, Boulder, Colorado

⁴Human Dimensions of Natural Resources, Colorado State University, Fort Collins, Colorado

Correspondence

Lawrence C. Hamilton, Department of Sociology, University of New Hampshire, Durham, NH 03824.

Email: lawrence.hamilton@unh.edu

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Abstract

Gray wolves (*Canis lupus*) were eliminated from the state of Oregon in the middle of the 20th century. By the early 21st century, wolves had returned to the northeast corner of the state, dispersing from populations reintroduced in Idaho and Wyoming. On a series of random-sample telephone surveys (2011–2018), we asked more than 3,000 northeast Oregon residents about their preferences concerning wolf management strategies. One-third of the respondents said that wolves should be eliminated from this region. Sociopolitical identity dominated other individual characteristics including age, education, years resident, and forestland ownership in predicting wolf-management views. Political effects appear even stronger when our indicator distinguishes the most conservative, and further intensify when most of the respondent's friends belong to the same party. This strong influence of sociopolitical identity echoes findings from the broader literature on environmental concern, but adds a new and policy-relevant element to wolf-attitude research. As wolves expand throughout the west, and new states consider reintroduction, state and federal wildlife managers face deeply rooted opposition. Managers must consider a range of strategies to manage wolves while working with community leaders in wolf-occupied areas to determine management options.

KEYWORDS

control, opinion, oregon, politics, predator, public, reintroduction, survey, wolves

1 | INTRODUCTION

In 2015, *The Guardian* ran a provocative headline: “Wolves in eastern Oregon are returning home—and it's started a culture war” (Wilson, 2015). The article highlighted the cultural divisions affecting how Oregonians view the gray wolf's (*Canis lupus*; henceforth “wolf”) reappearance in their state and the conflicting

perspectives among stakeholder groups (e.g., hunters, ranchers, wildlife managers, conservation biologists, and environmental organizations working on wolf issues) and Tribal governments. Although conflict with wolves in the United States has been in the news increasingly since (and before) their restoration to the Northern Rockies in 1995 and 1996, Wilson (2015) focused in particular on controversy in northeast Oregon, where wolf populations

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have only more recently been expanding to a level that has garnered attention. Over 100 wolves (of a total statewide population of 137 individuals: Oregon Department of Fish and Wildlife (ODFW), 2019a) currently live in this corner of the state—a region where human economic livelihoods are in transition, with forestry and other resource-based economic staples in decline, unevenly offset by diversification and new amenity-based development (Boag et al., 2015).

The biological recovery of wolves in portions of the Rocky Mountains has been characterized as a conspicuous achievement of the Endangered Species Act (Ashe, 2013). However, success of wolf recovery and subsequent delisting in this region (including eastern Oregon) has also been the source of considerable controversy. Historically abundant in Oregon, wolf populations in the state fell sharply following federal establishment of bounties in 1843. The last recorded bounty for killing a wolf in Oregon was paid in 1947. However, the passage of the Endangered Species Act in 1973 provided the legal framework to facilitate the recovery of the species. Following two decades of planning, the U.S. Fish and Wildlife Service (USFWS) reintroduced gray wolves from Canada (*C. lupus occidentalis*) to central Idaho and Yellowstone National Park in 1995 and 1996. From these core reintroduction areas, wolves eventually dispersed to eastern Oregon. By 2006–2007, they were living in the rugged Wallowa Mountains in the northeast corner of the state. The number of known wolves in Oregon rose from fewer than 20 in 2009 to more than 130 in 2018, with their distribution expanding gradually but still concentrated in the northeast. As wolf populations increased, so did conflict with humans. Of the 47 wolf deaths documented between 2000 and 2018, 40 were caused by humans, through legal control (18), accidental (6), or unlawful killing (13) (Oregon Department of Fish and Wildlife (ODFW), 2019b). Indeed, as the Oregon Department of Fish and Wildlife notes in their 2017 annual report on wolf conservation and management: “Anthropogenic (human-caused) mortality is the primary factor that influences dynamics of most wolf populations.” (Oregon Department of Fish and Wildlife (ODFW), 2018, p. 8; for a broader study see Murray et al., 2010).

Controversy and conflict arise from complex interactions with and attitudes toward wolves, particularly among big game hunters and livestock ranchers (Bradley et al., 2015; Breck et al., 2012; Bright & Manfredo, 1996; Bruskotter, Schmidt, & Teel, 2007; Manfredo, Teel, & Dietsch, 2016; Musiani & Paquet, 2004; Naughton-Treves, Grossberg, & Treves, 2003; Shivik, 2014; Sponarski, Semeniuk, Glikman, Bath, & Musiani, 2013; Treves, Naughton-Treves, & Shelley, 2013; Williams, Ericsson, & Heberlein, 2002; Young, Ma, Laudati, & Berger, 2015).

Overall, individual attitudes can be tied to the perceptions of economic risks and benefits associated with wolves, concerns regarding safety, and history of experience with wolves (Schroeder, Fulton, & Cornicelli, 2018; Young et al., 2015). However, presumptions regarding who is or is not in favor of coexistence with wolves and other large-bodied carnivores belie the complexity of views among stakeholders (Mazur & Asah, 2013; Shivik, 2014; Young et al., 2015). For example, Young et al. (2015) have found that proximity and experience with wolves and other predators shift through time, with individuals who have had a longer history of living in wolf habitat increasingly becoming more sanguine about the experience. At the same time, deeply rooted values aligned with domination or utilitarian views of wildlife may remain entrenched in certain communities, despite wider societal change (Manfredo et al., 2016; Manfredo, Teel, Sullivan, & Dietsch, 2017).

In regions of North America and Europe where wolves are found, the divide between rural and urban residents is often cited as a factor in supporting wolf conservation. For example, in Sweden, rural communities were found to have a lower willingness-to-pay for carnivore conservation as compared to urban residents. Researchers posited that this result was tied to socioeconomic factors as well as symbolic resentment of urban populations imposing their wishes on rural ones (Ericsson, Bostedt, & Kindberg, 2008). Rural communities may also depend on economic livelihoods that are affected by the presence of wolves. Hunters express concern about depredation of their desired game, particularly deer and elk (Ericsson & Heberlein, 2003; Treves et al., 2013; Williams et al., 2002). In southwestern Sweden (as in northeast Oregon) gray wolves dispersed on their own after extirpation for most of the 20th century. Work carried out there on hunter attitudes suggest that among the general population hunters have both the most accurate knowledge of, and also the most negative attitudes toward, wolves (Ericsson & Heberlein, 2003).

Concern voiced from local ranchers can be similarly negative. In Oregon between 2009 and 2017, confirmed annual losses of cattle due to wolves ranged as high as 11, and sheep up to 30, but without clear trends (Oregon Department of Fish and Wildlife (ODFW), 2018). Although a compensation system is in place to pay owners for livestock losses, ranchers object that the number of forensically confirmed losses does not match reality of the total number of livestock killed, loss of potential financial yield/head due to animals losing weight, and emotional costs of animal loss and living in habitat with predators (Shivik, 2014).

Although a majority of Oregon residents, especially from more populous western Oregon, may have favorable

attitudes toward wolves, local concerns in northeastern Oregon, amidst declining or stagnant rural economies, have rendered the issue of rebounding wolf populations a “cultural war” (sensu Wilson, 2015). The local reaction fits a broader pattern identified by Manfredo and coauthors (Manfredo, Bruskotter, et al., 2017; Manfredo, Teel, et al., 2017) of a “cultural backlash” by a minority segment of the public. Given that it is local northeastern Oregonians who are now adapting to both a newly burgeoning population of a misunderstood large-bodied predator, and to transitioning economic livelihoods, this region of Oregon appears potentially susceptible to such backlash. One decade following the publication of the first Wolf Management Plan in 2005 by the Oregon Department of Fish and Wildlife (ODFW), the State and USFWS delisted wolves from Endangered Species Act protection in the eastern reaches of Oregon in 2015 (east of Highways 395/78/95). Lethal control remains an approved management tool, and controlled take from hunting and trapping is authorized by the 2019 Conservation and Management Plan in the far-eastern zones, though has yet to be implemented (Oregon Department of Fish and Wildlife (ODFW), 2019c).

Understanding the array of factors that influence attitudes toward large carnivores holds central importance for developing successful strategies toward species recovery. Although a substantial literature examines values and attitudes toward wolves in both North America and Europe, recent reviews categorize the shortcomings with the existing body of research. Expósito-Granados et al. (2019) proposed a roadmap to addressing human-carnivore conflict in the American West. A key element in their framework argues that more research is needed to understand the social dimensions of conflict over carnivore management. There are also complex drivers (such as livestock depredation, trust of wildlife managers, and fear), in addition to those frequently studied, that may underpin relationships with large carnivores (Lozano et al., 2019).

These reviews highlight the need to explore social factors influencing human-carnivore relations. To that end, little attention has been devoted to the influence of underlying political orientation—a factor that has shown strong, often dominant effects on views concerning many other environmental topics (e.g., Hamilton & Saito, 2015). Furthermore, as Manfredo, Bruskotter, et al. (2017) and Manfredo, Teel, et al. (2017) found, it is unlikely that attempts to change individual values for conservation goals will be effective, as they are embedded within the values of other groups, organizations, and societies. They propose additional research that investigates how the values of groups and organizations (in this case, political parties) affect attitudes and behaviors of individuals within those organizations.

Sociopolitical identity is critical for ODFW (and other state agencies dealing with wolf populations) to understand in order to determine the appropriate management strategies and appetite for coexistence work in various communities living with wolves, and particularly in agricultural areas. In this article, we address this gap by testing sociopolitical identity alongside location and individual background factors as predictors of basic views on wolf management in northeast Oregon. Our data come from a series of large-scale, random-sample telephone surveys conducted over 2011–2018 as part of the Communities and Forests in Oregon research project (CAFOR; see www.cafor.weebly.com). The surveys, asking a range of community and environmental questions, comprised one social-science component of an interdisciplinary study concerning the linked economic and environmental transitions occurring in this region.

Below, we describe the CAFOR surveys, analytical methods, and results from testing respondent political identity and education alongside county of residence, year of survey, and other demographic factors as possible predictors for opinions about wolf policy. We find that political identity dominates other individual-level predictors of wolf opinions. Having a social network with friends primarily of the same party makes sociopolitical effects even stronger. Our results have implications for how policies and tools for species recovery are implemented, particularly in places where conservation goals may not align with the political leanings of the community. Results also are broadly relevant as other states advance recovery efforts, such as Initiative #107 in Colorado which will bring wolf reintroduction to the 2020 state ballot.

2 | METHODS

2.1 | History of CAFOR

In 2010, an interdisciplinary team of social and natural scientists began a project to study society–environment interactions in northeast Oregon. At first, the Communities and Forests in Oregon (CAFOR) project focused on Baker, Union, and Wallowa Counties, which have a combined 2016 population of 49,000 spread over more than 21,000 km². Subsequently the project's scope expanded to cover Crook, Grant, Umatilla, and Wheeler Counties as well, bringing the combined total to 115,000 people and 54,000 km²—not much above two people per square kilometer. The CAFOR study region, and especially its three original counties, largely overlaps with the heaviest wolf use areas. This comparatively remote region is far from the population centers of western Oregon, and has a great deal of forested or mountainous land managed by the federal government. Private industrial forest

interests own a smaller but significant fraction. Until recent decades, forest products were an economic staple, but timber production has fallen steeply in the face of global competition and rising costs. As traditional resource-based livelihoods in this region decline and some people move away, the economy becomes necessarily more mixed. Natural amenity-based development, a growing but not dominant component, attracts some new migrants from elsewhere. Further background on the region's changing physical and human geography, along with findings from the cumulative CAFOR research, appear in papers by Boag et al. (2015, 2016, 2018), Crowley, Hartter, Congalton, Hamilton, and Christoffersen (2018), Hamilton et al. (2012, 2016); Hamilton, Hartter, Safford, and Stevens (2014); Hamilton, Bell, Hartter, and Salerno (2018); Hamilton, Hartter, and Bell (2019), and Hartter et al. (2014, 2015, 2017, 2018, 2020).

2.2 | CAFOR surveys

One part of the CAFOR research involved a series of telephone surveys carried out in four stages over 2011–2018

TABLE 1 Four CAFOR surveys

2011: The first Communities and Forests in Oregon (CAFOR) survey involved landline and cell telephone interviews in September/October 2011, with residents of Baker, Union, and Wallowa counties in northeast Oregon ($n = 1,585$).

2014: The project's geographic scope expanded with the second CAFOR survey, conducted in August/October 2014. Telephone interviews occurred with 1,752 residents of seven northeast Oregon counties: Crook, Grant, Umatilla, and Wheeler counties in addition to the original three (Baker, Union, and Wallowa). To maintain comparability with years 2011 and 2018; however, only those respondents from Baker, Union, and Wallowa counties ($n = 802$) are included in the main analyses for this article.

2015: A third survey again carried out cell and landline telephone interviews across these seven counties, completing 651 interviews in October/November 2015. Only the Baker, Union, and Wallowa county respondents ($n = 298$) are included with the main analyses of this article.

2018: The most recent CAFOR survey returned to a narrower focus on just the original three counties, conducting cell and landline interviews in September 2018 ($n = 1,097$). The 2018 survey for the first time included the *friends* question (Do most of your friends prefer the same political party?); see Table 2 for wording.

Median response rate of the four surveys was 38% (AAPOR, 2016 definition 3). Sampling weights are employed with all graphs and statistical analyses in this article, as in most other CAFOR project publications, making minor adjustments for design and response bias to achieve more representative results.

(Table 1). The surveys employed consistent methods with landline or cell telephone interviews of independent random samples, conducted by trained personnel from the Survey Center at the University of New Hampshire. Questions covered a range of topics related to respondents' perceptions of their communities and environments. Some questions were repeated with identical wording on two, three or four surveys, watching for continuity or change in public opinion (Boag et al., 2016; Hamilton et al., 2019; Hamilton, Bell, et al., 2018). Questions with less interesting or interpretable results were dropped, and promising new questions added, as the project matured. The survey design involved stratification with oversampling of smaller-population counties, and in some cases also of forest landowners. To adjust for both design and response bias, probability weights (inverse of the probability of selection) are applied for all graphs and statistical analyses in this article. Effects of this weighting on variables of interest here are not large, but make the results more representative with respect to county populations and age/sex distributions.

Geographic coverage varied across the four surveys. The initial stage in 2011 sampled residents from three counties: Baker, Union, and Wallowa. Subsequently, the 2014 and 2015 surveys expanded to seven contiguous counties, including those three. The project's final survey in 2018 refocused on the original three. A total of 5,085 interviews had been conducted, 3,782 of them involving residents of Baker, Union or Wallowa County. To maintain comparability, our main analysis in this article concerns only that three-county subset, although we note that key conclusions remain similar if we instead analyze only data from the other four counties (surveyed in 2014 and 2015) as a replication.

2.3 | Survey questions

The return of wolves has been controversial in this region, particularly with ranchers and hunters. To measure views among the general public, we asked on all CAFOR surveys: "Which of the following four statements about wolves in eastern Oregon comes closest to your personal beliefs?" (See Table 2 for complete question wording.) Respondents could choose eliminating wolves from the region, limited hunting, or no hunting with or without compensation for livestock losses. These simple choices by no means exhaust the possible views on wolf management, but only 3% of our respondents were unable to choose between them. As will be seen, responses were highly structured in terms of individual characteristics and location, and replicable across survey years—suggesting high validity despite or because of the question's simplicity.

TABLE 2 Views on wolf management, respondent characteristics, county, and year of interviews for northeast Oregon Communities and Forests in Oregon (CAFOR) surveys over 2011–2018. Shown with codes used for modeling in Table 3; order of first two responses to the *wolves* question was rotated in interviews

<i>Dependent variable</i>
<i>Wolves</i> —“Which of the following four statements about wolves in eastern Oregon comes closest to your personal beliefs?”
Wolves should be eliminated from eastern Oregon (32%, coded 1)
Limited hunting of wolves should be allowed (43%, coded 0)
Wolves should not be hunted, but landowners compensated for losses (19%, coded 0)
Wolves should not be hunted, and no landowner compensation is needed (4%, coded 0)
Do not know/no answer (3%, coded 0)
<i>Respondent characteristics</i>
<i>Age</i> —Respondent’s age in years (18–96; mean 51)
<i>Sex</i> —Coded 1 for female (51%), 0 for male
<i>Newcomer</i> —Coded 1 if respondent lived in area less than 10 years (24%), 0 otherwise
<i>Ownfor</i> —Coded 1 if respondent owns 10 or more acres of forested land in region (11%), 0 otherwise
<i>Education</i> —High school or less (29%, coded –1), some college or technical school (30%, coded 0), college graduate (26%, coded 1), or postgraduate (15%, coded 2)
<i>Party3</i> —(2011–2018 surveys) Democrat (29%, coded –1), Independent (16%, coded 0), Republican (55%, coded 1)
<i>Party4</i> —(2018 survey only) Democrat (25%, coded –1), Independent (15%, coded 0), Republican (39%, coded 1), Tea Party supporter (20%, coded 2). This 4-party ordinal indicator was constructed from two questions: political party identification (same wording as Party3), then a second question asking whether respondent supports the goals of the Tea Party. See Hamilton and Saito (2015) for validity evidence regarding this indicator.
<i>Friends</i> —(2018 survey only) “Would you say that most of your friends prefer the same political party that you do? Or do most prefer different parties? Or are they about evenly divided?”
Most of my friends prefer the same political party I do (34%, coded 1)
Most of my friends prefer different political parties than I do (10%, coded 0)
My friends are evenly divided in their political party preferences (47%, coded 0)
Do not know/no answer (9%, coded 0)
<i>County and year</i>
County of residence
<i>Baker</i> —Coded 1 if respondent lives in Baker County (32%), 0 otherwise (base county in Table 3)
<i>Union</i> —Coded 1 if respondent lives in Union County (48%), 0 otherwise
<i>Wallowa</i> —Coded 1 if respondent lives in Wallowa County (21%), 0 otherwise
Year of survey
<i>2011</i> —Coded 1 for 2011 survey (45%), 0 otherwise (base year in Table 3)
<i>2014</i> —Coded 1 for 2014 survey (17%), 0 otherwise
<i>2015</i> —Coded 1 for 2015 survey (7%), 0 otherwise
<i>2018</i> —Coded 1 for 2018 survey (31%), 0 otherwise

2.4 | Data selection

Four CAFOR surveys conducted over 2011–2018 interviewed a combined total of more than 5,000 northeast Oregon respondents (Table 1). The surveys employed similar methods and asked many of the same questions, so in principle they could be integrated into one dataset. In practice, however, secondary variations in questions asked or geographic coverage restrict us to partly

overlapping subsets where these factors are consistent, for purposes of a particular analysis. Three such subsets are employed in this article.

- 1 Interviews from all four survey years (2011, 2014, 2015, 2018; $n = 3,782$) from Baker, Union, and Wallowa counties. A simple three-party political question was asked in 2011; all later surveys asked two political questions, permitting construction of a four-party indicator

as described by Hamilton and Saito (2015), but to maintain consistency with 2011, we use only the three-party version for analysis of this subset.

- 2 Interviews from 2018 only, also in Baker, Union, and Wallowa counties ($n = 1,097$). The 2018 survey for the first time asked about political identification of the respondent's friends, so its effects are tested only with these data. The more detailed four-party indicator also can be used for this analysis; in terms of respondents, the 2018 survey comprises a subset of the 2011–2018 dataset.
- 3 About 1,300 respondents in four additional counties (Crook, Grant, Umatilla, and Wheeler) were interviewed in 2014 or 2015 only. These geographically distinct data and nonoverlapping interviews are not mixed into the main three-county analyses here, but provide an independent replication for several of its key findings, as mentioned in the discussion.

2.5 | Statistical methods

Statistical analyses were performed using Stata version 16, applying probability weights consistently for percentages, graphs, and modeling. Models shown involve weighted logit regression, a method appropriate for binary dependent variables such as elimination/no elimination of wolves. The original *wolves* survey question offered respondents four choices, so an alternative approach could use multinomial logit regression. The corresponding multinomial models, however, are three times more complicated (i.e., three parameters are estimated for each predictor variable, against a reference value), while reaching substantially the same conclusions. Other coding choices specified in Table 2, for use in modeling, similarly provide the most clear, replicable and robust results. Political party is treated as an ordinal predictor due to its consistently monotonic and close to linear effects on environmental topics, in the present datasets and many others (e.g., see Hamilton & Saito, 2015; Hamilton, Bell, et al., 2018; Hamilton, Lemcke-Stampone, & Grimm, 2018).

3 | RESULTS

Almost one-third of respondents chose the response “eliminate wolves from eastern Oregon.” Twenty-three percent took the opposite view that wolves should not be hunted. Seventy-five percent of respondents favored policy that endorsed a lethal component to management, either through hunting (43%) or complete eradication of wolves from the region (32%) (Figure 1).

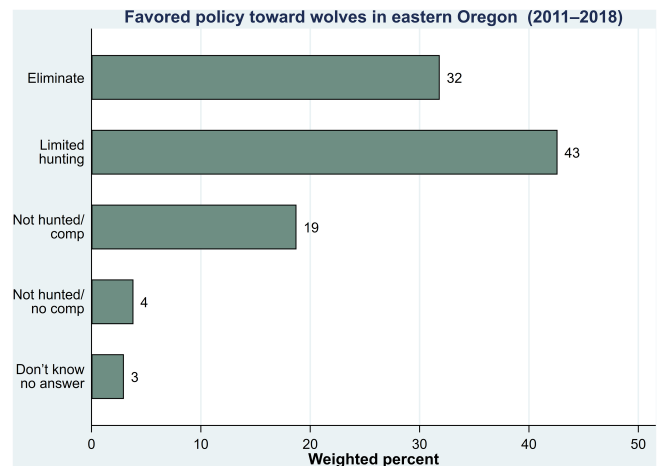


FIGURE 1 Responses to question about favored policies regarding wolves in eastern Oregon (pooled 2011–2018 survey data; $n = 3,782$)

Other variables defined in Table 2 include survey timing (year) and location (county), and the individual background characteristics of age, sex, education, and political identity. Statements about newcomer/old-timer differences arose frequently in our discussions with area residents, so a simple indicator for less than 10 years of residence in northeast Oregon is included. The relevance of land ownership in shaping perspectives also came up; Table 2 lists an indicator for owning 10 or more acres of forestland. The actual number of years resident, and finer gradations in the number of acres owned, were recorded by survey interviewers but raise collinearity and outlier problems. Simple dichotomies prove less problematic and yield consistent, interpretable results.

Political-identity indicators such as party or self-described ideology tend to dominate other background factors in predicting a wide range of environmental or science-related opinions. On the 2011 CAFOR survey, party was assessed by a single question asking whether respondents considered themselves to be Democrat, Republican, or Independent (*party3* in Table 2). Later surveys added a question asking whether they supported the movement known as the Tea Party. Together, these two questions permit construction of a four-party political indicator (*party4*) for the 2014, 2015, and 2018 survey data (Hamilton et al., 2016; Hartter et al., 2018). Because they distinguish the most conservative respondents, such four-party indicators commonly exhibit stronger links to environmental and science opinions (Hamilton & Saito, 2015).

In one of our questions, we queried homogeneity in respondents' social circles: “Would you say that most of your friends prefer the same political party that you do? Or do most prefer different parties? Or are they about

evenly divided?” This *friends* question was a new addition on the 2018 CAFOR survey. Thirty-four percent report that most of their friends prefer the same political party. As a predictor of opinions about wolves and other matters, this proved to be important.

3.1 | Identity, location, and attitudes

Overall, 32% of respondents favor elimination of wolves, but this proportion is much higher in some subgroups. Figure 2 shows significant differences by respondent age, sex, newcomer status, forestland ownership, education, and political party (both three- and four-party versions). “Eliminate wolves” responses also are significantly more common from Wallowa County, where most of the region’s wolves live. Differences between survey years, on the other hand, are not significant. Note that the gaps of 26 points for *party3*, or 39 points for *party4*, are by far the largest observed in these breakdowns.

Table 3 carries the analysis of background factors a step further, entering all predictors together in logit regression models to test whether the two-variable effects seen in Figure 2 might be spurious. Model 1 employs the full 4-year, three-county dataset: 3,782 interviews reduced by missing values to an estimation sample of 3,332. Because the 2011 stage asked only a three-party political question, *party3* serves as our political indicator in Model 1. Model 2 on the other hand employs only the 2018 survey data (1,097 interviews reduced to an estimation sample of 984), so it can use the four-party indicator *party4*, and also the new *friends* variable. *Friends* is tested not only as a main effect, but also in a *friends* × *party4* interaction, discussed in the next section.

Model 1 finds that eliminating wolves is favored most strongly in the first survey year (2011). All of the variables exhibiting significant bivariate associations in Figure 2 have significant effects in multivariate analysis as well; none of the bivariate results appear spurious. Survey year now makes a significant difference as well: other things being

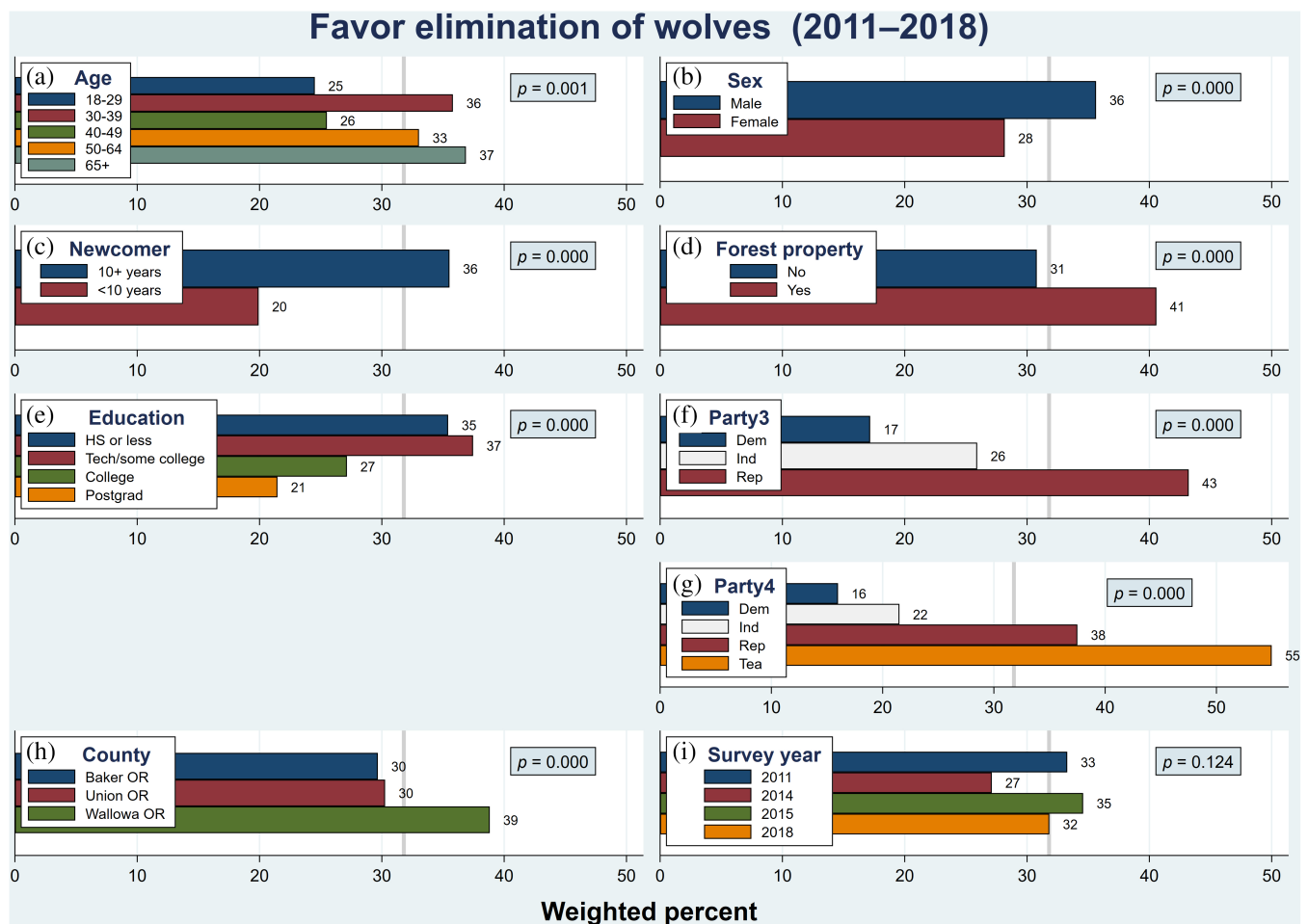


FIGURE 2 Percent favoring elimination of wolves, broken down by respondent characteristics, county, and survey year. Panel g (*party4*) depicts 2018 results only; other panels pool data from all four survey years. *p*-Values are probabilities from adjusted Wald tests in weighted logit regressions

	Model 1, 2011–2018		Model 2, 2018 only	
	Coef (SE)	Odds	Coef (SE)	Odds
Age	0.007 (0.003)*	1.007*	0.003 (0.004)	1.003
Sex (female)	−0.367 (0.098)***	0.693***	−0.203 (0.159)	0.817
Newcomer	−0.753 (0.144)***	0.471***	−0.765 (0.262)**	0.465**
Ownfor	0.332 (0.133)*	1.394*	0.453 (0.211)*	1.573*
Education	−0.257 (0.048)***	0.773***	−0.178 (0.081)*	0.837*
Party3 (D-I-R)	0.648 (0.062)***	1.913***	—	—
Party4 (D-I-R-T)	—	—	0.398 (0.100)***	1.489***
Friends	—	—	−0.354 (0.217)	0.702
Friends × party4	—	—	0.635 (0.166)***	1.888***
County				
Baker	—	—	—	—
Union	0.038 (0.115)	1.039	0.036 (0.200)	1.037
Wallowa	0.546 (0.121)***	1.727***	0.588 (0.203)**	1.800**
Year				
2011	—	—	—	—
2014	−0.314 (0.153)*	0.731*	—	—
2015	−0.249 (0.199)	0.779	—	—
2018	−0.293 (0.110)**	0.746**	—	—
Estimation sample	3,332		984	
F statistic	20.26***		11.16***	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$ (Wald tests).

equal, wolf elimination was less popular in later years than it had been in 2011. In bivariate analysis (Figure 2i), the 2015 percentage was high also, but the Model 1 results suggest that can be accounted for by a different mix of respondents—such as randomly higher fractions of male and Republican respondents in the relatively small 2015 sample: 52% male and 59% Republican, compared with 48–50% male and 54–56% Republican in the three other years. Model 1 controls for such background variations; after taking them into account, support for wolf elimination in 2014, 2015, and 2018 was lower than in 2011. This contingent result, in need of replication, hints that public acceptance of wolves, or at least resignation to their presence, may have grown as wolves stayed in the area.

According to Model 1, the odds a respondent favors wolf elimination are about 31% lower (multiplied by the odds ratio 0.693) among women than men, other things being equal. They are 53% lower among newcomers, and 39% higher among forest landowners. The odds of favoring elimination are multiplied by 1.007 per year of age, or by $1.007^{10} = 1.072$ (increase about 7%) per decade. They decrease by 23% with each degree of education, and rise by 91% with each step in party3, from Democrat to Independent to Republican.

TABLE 3 Respondent characteristics, county, and survey year as predictors of favoring elimination of wolves from eastern Oregon. Coefficients, SE, and odds ratios from probability-weighted logit regressions

Looking only at 2018 data, and with more detailed political indicators, Model 2 finds weaker age and sex effects but is otherwise substantively similar. Because this model contains the interaction term *friends* × *party4*, the main effect of *party4* corresponds to the effect of political party among people whose friends do not mostly prefer the same party (i.e., *friends* = 0). Similarly, the main effect of *friends*, which is not significant, represents the effect of having friends mostly of the same party, when the respondent identifies as Independent (i.e., *party4* = 0).

3.2 | The influence of same-party friends

The *friends* × *party4* interaction is visualized by an adjusted margins plot in Figure 3, calculated from Model 2. Having mostly same-party friends intensifies partisan effects on supporting wolf elimination, especially for Tea Partiers. Among Tea Party supporters with friends of different or mixed parties, the predicted probability of favoring wolf elimination is about 43%. Among Tea Partiers with friends mostly of the same party, this probability rises to 64%. Same-party friends intensify Democrats' views on wolf elimination in the opposite direction, but

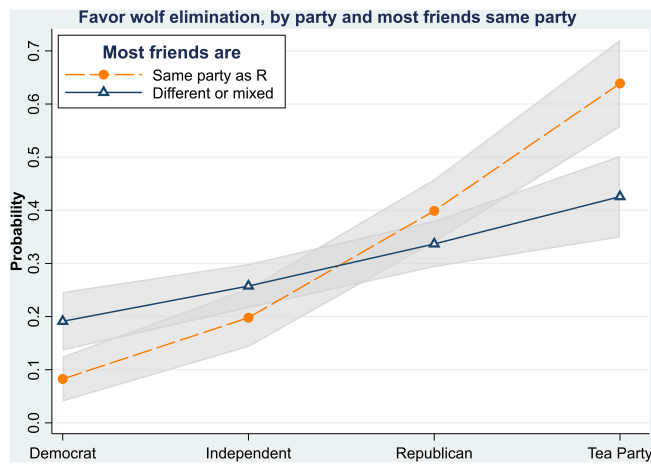


FIGURE 3 Interaction between respondent's own political party and having most friends belong to the same party, intensifying the partisan effect on favoring wolf elimination. Adjusted margins plot calculated from Model 2 in Table 3 (2018 survey data)

to a lesser degree: from 20% down to 9%. Among Independents and non-Tea Party Republicans, homogeneity of friends' politics has less impact.

4 | DISCUSSION

Humans have a deep and entangled history with wolves. The first archaeological evidence of wolf skulls with domesticated dog-like traits dates to ~32,000 years BP from the Goyet Cave, Belgium, though the exact timing, location(s), and number of centers of dog domestication from a wolf ancestor remains uncertain (Germonpre et al., 2009). Though early ideas regarding dog domestication posited capture and control of wild wolf pups, general consensus today is that the early relationship was a cooperative one, with the two species (wolf and human) deriving ecological benefits that facilitated, through time, a coevolved relationship that has influenced the traits of both (Francis, 2015; Pierotti & Fogg, 2017; Shipman, 2015). Relationships with wild wolves became increasingly complicated, however, as human settlements expanded and livelihoods shifted from big-game hunting to pastoralism and agriculture. Negative attitudes toward wolves grew especially prominent in regions of Medieval Europe during periods of acute climate stress, bubonic plague, and rabies outbreaks among wolves scavenging in urban centers (Busch, 2018). Negative and deeply embedded "Big Bad Wolf" attitudes toward gray wolves were part of the cultural attitudes of the European diaspora, carried with early colonists settling the western regions of the United States and elsewhere (e.g., Japan), prompting a concerted and in the U.S. federally mandated extirpation policy.

Wolf restoration and recolonization by wolves has been a relatively recent phenomena, often with support from public opinion and science (e.g., Licht, Millsbaugh, Kunkel, Kochanny, & Peterson, 2010; Pate, Manfredo, Bright, & Tischbein, 1996; Ripple & Beschta, 2012; Williams et al., 2002), but also meeting strong opposition (e.g., Scarce 2008; Wilson, 1997). News reports on wolf depredation of livestock, hunting or ecosystem-wide impact in affected U.S. regions commonly evoke heated reader responses, both pro- and anti-wolf, that can rapidly turn to stereotyping and personal attacks. Our CAFOR survey results indicate that sociopolitical identity predicts views on wolf management, much more strongly than other (though also important) factors such as respondent demographics, county of residence, newcomer/old-timer status, or forestland ownership. Indeed, it seems reasonable to suspect that sociopolitical identity underlies many perceptions about wolves that have been reported in the literature, as it does for environmental topics more generally.

As several decades of literature—spanning rangeland science, ecology, conservation biology, history, anthropology, sociology, and psychology—have demonstrated, attitudes and values regarding wolves are shaped by numerous factors (Nie, 2003). Yet, to the best of our knowledge, political party affiliation has not been among the variables that have been included in these analyses. Our results suggest that this "omitted variable" may be a quite basic factor, with stronger effects on wolf attitudes than most other respondent characteristics. This observation connects wolf perceptions with decades of research on more general environment-related concerns, where sociopolitical identity tends to dominate opinions. It does not, however, undermine the value of identifying more intermediate factors, potentially more malleable than sociopolitical identity, that can also influence perceptions to help build public support for efficacious and broadly acceptable wolf policies (Meadow et al., 2010; Mech, 2017; Shivik, 2014; Wilson & Bruskotter, 2009). Managers may need to employ a range of management tactics, including lethal control and hunting, to possibly increase tolerance for the presence of wolves among diverse constituents, as well as establish trust between the agency and individuals who may be directly affected by wolves (e.g., ranchers).

In this study, we found that (a) only one third of the respondents support elimination of wolves from the region, whereas two thirds do not; (b) support for wolf elimination may have decreased over time; and (c) people with more education are less likely to support elimination. Our survey analysis focused on a single wolf question, using data from one corner of a single state. Despite this limited scope, we have reason to think that

conclusions are robust. The samples are large, repeated and representative of regional populations. Basic findings concerning the effects of respondent age, sex, newcomer/old-timer status and education parallel those of previous studies from other regions that used different research designs and frequently more elaborate measures for views about wolves. Most previous studies did not test sociopolitical identity as a predictor, but some invoke constructs that align with this dimension—such as environmentalism vs. wise use (Wilson 1997), perceptions about government control (Scarce, 2008), or predisposition to vote for wolf reintroduction (Pate et al., 1996). To the extent that sociopolitical identity unites and underlies a broad range of such constructs, our results are compatible.

The use of a four-party political indicator, which effectively distinguishes very conservative from conservative respondents, reveals a notable jump in wolf perceptions as well (Figures 2f,g). A three-party indicator is the strongest predictor of wolf-elimination views in Model 1 of Table 2; the four-party indicator in Model 2 is even stronger. Similar patterns occur independently in a “withheld” fraction of the CAFOR data, not analyzed here, consisting of 1,303 interviews from four other northeast Oregon counties (Crook, Grant, Umatilla, and Wheeler) that CAFOR surveyed in 2014 and 2015 only. Support for wolf elimination overall was lower in these four counties (26% compared with 32%), which are somewhat farther from most of the wolves. In multivariate analysis, however, a three-party political indicator again proves to be the strongest predictor of such views, and a four-party indicator even stronger. Future studies should employ sociopolitical indicators that, like *party4*, can distinguish the most conservative subgroup of respondents.

The *friends* × *party* interaction graphed in Figure 3, indicating that having mostly same-party friends intensifies partisan views on wolves, highlights the “socio” part of sociopolitical. It replicates an interaction found in a 2017 survey of the rural North Country of northern New England, where people were asked whether local winters over the past 20 years had been warmer, cooler or about average compared with winters 30 or 40 years ago (Hamilton, Lemcke-Stampone, & Grimm, 2018). Objectively, average winter temperatures in that region had recently been much warmer. The reality of winter warming was recognized by a majority of survey respondents young and old, male and female, with little or much education—but not by the most politically conservative, for whom perceptions about local weather followed their beliefs rejecting climate change. Moreover, the partisan gradient regarding both local weather and climate change was intensified by having friends mostly of the same party—significant *friends* × *party* interactions that

have the same general meaning as that in Figure 3, although the context is much different.

Including the *friends* question on both rural surveys was motivated by more general reports that Americans increasingly choose to associate socially with people of their own political party, which accentuates polarization (Iyengar & Westwood, 2015; Pew Research Center, 2016, 2017). Widely observed trends on social media, where people chose exposure mainly to like-minded voices, encourage asking this question as well. With this 2017 New England study and the 2018 CAFOR, we now have two independent surveys, on nominally unrelated issues and from rural regions on opposite sides of the continent, reporting the same interaction. Despite the exploratory nature of the *friends* × *party* effect, the finding has relevance for wolf recovery and management in the region. Specifically, in counties where sociopolitically relatively homogenous groups are those interacting with wolves most frequently, wildlife managers may face compounding opposition. Conversely, this finding offers hope that if collaborative approaches to wildlife management can gain traction with respected community members, then progress toward coexistence has potential to spread (Madden & McQuinn, 2014).

We recognize that further study is needed to characterize the breadth of associations between sociopolitical identity and attitudes toward conservation issues broadly or wolf recovery more specifically. However, given current politics regarding the Endangered Species Act, potential federal delisting of the gray wolf, and the unprecedented ballot measure (Initiative #107) in Colorado which will put wolf reintroduction on the 2020 ballot, we view these preliminary results as important information relevant to conservation tactics, and a noteworthy example of how “social science is needed more than ever in U.S. wildlife management” (Manfredo, Salerno, Sullivan, & Berger, 2019).

4.1 | Summary

Random-sample telephone surveys of northeast Oregon residents over 2011–2018 carried a common question about policies concerning wolves, which have recently recolonized this region. Thirty-two percent of respondents in a three-county region where wolves are active chose an extreme response: wolves should be eliminated. This fraction is significantly higher among older respondents, males, long-term residents, forest-landowners, and those without a college education. It also is higher in one county with the most wolves. Each effect is consistent with previous studies from other places and times. We also found, however, that respondent sociopolitical

identity eclipses all other predictors of wolf opinions, and its effect becomes even stronger when our political indicator distinguishes the most conservative. Political effects on wolf opinions intensify further if respondents report that most of their friends belong to the same political party. Causality behind this new finding could operate in both directions, with same-party friends intensifying partisan views, but also the most intense partisans choosing same-party friends. Either process supports our reference to sociopolitical identity, rather than simply politics, as the most influential predictor of views about wolves. The dominant influence of sociopolitical identity is an all-too-familiar result from the broader literature on environmental concern, although it has not been centered in wolf-attitude research.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

Lawrence C. Hamilton and Joel Hartter designed the study and oversaw data collection. Lawrence C. Hamilton led the drafting of the manuscript and analyzed the survey response data. All authors contributed to providing critical feedback, writing, and editing various parts of the manuscript. All approved the final submission.

DATA AVAILABILITY STATEMENT

Data are available on the Dryad Data Repository (doi: 10.5061/dryad.wm37pvmhr).

ETHICS STATEMENT

Institutional Review Boards at the University of New Hampshire and the University of Colorado granted approval for all human subjects research.

ORCID

Lawrence C. Hamilton  <https://orcid.org/0000-0003-1977-0649>

Joanna E. Lambert  <https://orcid.org/0000-0002-2849-3930>

Lydia Anne Lawhon  <https://orcid.org/0000-0002-7579->

199X

Jonathan Salerno  <https://orcid.org/0000-0001-9402-6479>

Joel Hartter  <https://orcid.org/0000-0002-2255-1845>

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